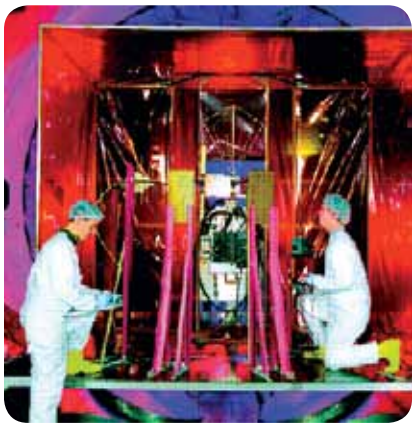
National Aeronautics and Space Administration

NASA's Space Simulation Test Facilities

NASA GLENN RESEARCH CENTER
THERMAL VACUUM TESTING FACILITY 5



Vacuum Facility 5 (VF5) is a 15-foot-diameter thermal vacuum facility located at NASA Glenn Research Center (GRC) in Cleveland, OH. The test chamber and supporting infrastructure serve as a valuable resource in space simulation ground testing. Some unique facility capabilities include a large chamber volume (15 feet in diameter by 60 feet long) and, depending on test requirements, the option of using the internal helium/liquid nitrogen cryogenic pumping system or a nitrogen, cold-trapped, oil diffusion pumping train.

The clean, cryogenic vacuum system provides a no-load base pressure of 1×10^{-7} Torr at a theoretical pumping speed of 3,500,000 liters/second on air. Approximately 40 m^2 of helium surface removes 750 W at 20 K. A baffled, diffusion pump system provides 250,000 liters/second pumping supporting noncondensible gases.

The 16-ton, closed-loop helium refrigeration system provides cryogenic temperatures conducive to maintaining hard vacuum while testing high-power test articles. This system also provides the option of an inexpensive and a continuous supply of helium for test article exposure. The test chamber has an internal rail system and an overhead beam for hoist operations. The facility is oriented horizontally with an attached 5-foot-diameter by 6-foot-long valved test port. Additional test capabilities consist of a large staging area; access to a class 1,000 clean room; a machine shop; and automatic, unattended vacuum operations. The VF5 is one of more than 25 chambers included in the unique suite of vacuum facilities supporting space simulation ground testing at GRC.

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CHARACTERISTICS

Overall dimensions	
Main chamber	15 feet in diameter x 60 feet long
Test port	5 feet in diameter x 6 feet long
Internal working dimensions	
Main chamber	13 feet in diameter x 30 feet long
Test port	5 feet in diameter x 6 feet long
Vacuum system	
Cryopanels	750 W at 20 K, 40 m^2 of helium surface providing a no-load pressure of 1×10^{-7} Torr with a pumping speed of 3,500,000 liters/second on air
Diffusion pumps	20 32-inch pumps with nitrogen cold traps providing a no-load base pressure of 1×10^{-7} Torr with a pumping speed of 250,000 liters/second on air
Thermal simulation	
Cold	Liquid nitrogen and helium surfaces available upon request
Heat	Configurable lamps available upon request
Instrumentation	Thermocouples, RGA, TQCM, cameras, and other necessary test equipment
Additional	Multiple test port and feedthroughs, automatic and unattended vacuum operation, large staging area, class 1,000 clean room, and machine shop

FACILITY APPLICATIONS

- Thermal vacuum testing of flight experiments
- Spacecraft hardware development
- Plasma interaction effects on spacecraft hardware and materials
- Advanced materials applications
- Electric propulsion research development
- Integration of space power systems

CONTACT INFORMATION

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